an attempt to illustrate the areas tributary to each railway company, which, if properly done, would be a most valuable guide to business men. The present map is hardly successful in showing more than the obvious, and in the crowded area of south Lancashire and the West Riding of Yorkshire, even when shown on a larger scale in an inset, the method adopted does not do justice to some of the lines. No attempt has been made to distinguish areas which are served by more than one railway; nor does the compiler seem to have taken configuration into account in preparing the map. No doubt the details can be worked out on the half-inch maps which come later, but what might have been a very effective and useful map is somewhat spoilt. It resembles a rough railway company diagram rather than the other maps of the atlas.

The density of population maps by Mr. Bosse, in which the uninhabited area is first marked off, are clear, and reveal a multitude of points not indicated on maps which show the density of population by counties. They form a very effective contrast to two maps showing densities of agricultural, of industrial and commercial population by counties, which, however, summarise the more obvious contrasts of density and of distribution. Administrative divisions, political and ecclesiastical, a commercial and a mineral map end the first section of the atlas.

(2) It is scarcely necessary to direct attention to the merits of Bartholomew's half-inch contoured map, which everyone uses who cycles or motors. It is beautifully printed on sixty-seven sections. The contour lines, as on the Ordnance maps, are shown for every 100 feet up to 1000 feet, and for every 250 feet above that. The areas between each consecutive 100 feet up to 400 feet are tinted in shades of lighter and lighter green, between each 200 feet to 1000 feet, and then between each 250 feet, in deepening shades of brown, a purplish tint being used for the bands between 2750 feet and 3000 feet. This is a reasonable compromise, but for students of orographical features a single colour in different shades would give a clearer picture. The great defect of our Ordnance maps is the absence of a closer contour interval, and for the inadequacy of the existing data in exhibiting the characteristics of the relief Mr. Bartholomew cannot be held responsible.

These maps are wonderfully accurate; in some places they are more up to date than the survey sheets. Only here and there have we detected minor errors. The arrangement of the sections in the atlas is confusing. The numbers zigzag in such a way that it is not possible, without turning to the sheet inside or to the key map, to discover whether they run eastwards or westwards. This difficulty might have been avoided by printing a key map beneath the number outside each sheet and shading the area of the section drawn inside.

(3) The town plans call for little comment, except that they should have been on a uniform scale.

(4) The text consists of clear descriptions of the physical features in relation to political and commercial development by Dr. Mill, with one or two slips, and of the geological features by Sir Archibald Geikie; temperature and rainfall tables for more than a hundred stations (the latter, unfortunately, only for a ten years' mean); agricultural, population, ecclesiastical, demographic, political, commercial, industrial, and railway statistics; a list of railways; the etymology of English and Welsh place-names; and an invaluable bibliography of the maps of the country from the earliest times, specially compiled by Mr. Bartholomew.

It will be seen that the atlas deserves its comprehensive title. The time and art required to produce it have been great, and Mr. Bartholomew very properly makes due acknowledgments to his skilled assistants. The execution is admirable, and the work is not merely one of great scientific importance, but also a specimen of cartography worthy of the reputation of the house of Bartholomew.

LEATHER FOR BOOKBINDING.

Report of the Committee on Leather for Bookbinding. Edited for the Society of Arts and the Worshipful Company of Leathersellers by the Right Hon. Viscount Cobham and Sir Henry Trueman Wood. Pp. 120. (London: George Bell and Sons, 1905.) Price 10*s.* 6*d.*

IN recent years there has been considerable dissatisfaction with the quality of leather used for bookbinding; although many old books have their bindings still in good condition, others more recently bound have become dilapidated. In 1899 the School of Arts and Crafts formed a committee for the investigation of the subject, which appealed later to the council of the Society of Arts requesting it to undertake a thorough examination of the whole question, and in February, 1900, the society agreed to appoint a committee for the purpose. The first meeting was held in May, 1900, and two subcommittees were elected from the members; the first, consisting of Mr. Cyril Davenport, of the British Museum Library; Dr. J. Gordon Parker, director of the London Leather Industries' Research Laboratories; Mr. A. Seymour-Jones, leather manufacturer; Mr. W. J. Leighton, bookbinder; and Mr. Douglas Cockerell, bookbinder, was to visit various libraries to ascertain the comparative duration of various leathers used at different periods and preserved under different conditions. The second subcommittee consisted of Dr. J. Gordon Parker, Prof. Henry R. Procter, professor of leather industries at Leeds University, and Mr. A. Seymour-Jones; its duty was to ascertain the cause of any deterioration noticed and to suggest methods for its prevention. Mr. M. C. Lamb, director of the leather dyeing and finishing department of Herold's Institute, was afterwards added to this committee.

The committee reported in June, 1901, and the report was printed in the *Journal* of the Society of July 5. It was considered desirable to reprint the report in a more permanent form, and with the financial assistance of the Leathersellers' Company the present volume has been produced, which contains more detailed accounts of the work of the subcommittees

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than were contained in the appendices to the original report.

It was found that all the bindings examined showed evidence of decay, but the books bound during the last 80 or 100 years were in a worse condition than many of those of an earlier date; some recent binding had deteriorated in as short a period as five years. The deterioration became more general in books bound after 1830; some leather seemed to be good until 1860, after which date nearly all leather appeared to get worse.

Besides the quality of the leather, the conditions under which books are kept have a great influence on the durability of the bindings. When ventilation is good and artificial light is not used the books are in a better condition. The products of the combustion of gas do much mischief, especially on the upper shelves of a library, where the temperature is often considerably raised by the heat from the flames. Sad to relate, tobacco smoke is said to be deleterious. Daylight, and especially direct sunlight, has a bad effect on some leathers and also on the colours of the dyes.

The report discusses fully the durability of the different kinds of leathers which have been used for bookbinding and also the construction of bindings; a specification for binding heavy or valuable books and also one for ordinary library binding are given.

The second subcommittee investigated the cause of decay by many experiments. Three different kinds of skins were tanned with eleven different agents, the tanning process being modified in portions of the specimens. Small strips of the leathers were fastened on boards with one half of each strip exposed and then submitted to various actions—direct sunlight, light from a fish-tail gas-burner, light from an incandescent gas-burner and from an incandescent electric lamp, the fumes and heat of burning gas, currents of moist and dry air alternately in a closed vessel kept at a temperature of 60° to 70° F., carbonic acid gas, and sunlight, but protected from air by glass; the results of many of these experiments are shown by excellent coloured plates.

Experiments were made with purchased leathers, most of which were found to contain free sulphuric acid; this acid has been used of recent years for brightening the colour of bark-tanned calf, from which it removes the iron and tan stains, and much improves the appearance of the material. It was found that in every case the presence of sulphuric acid hastened the destruction of the leather by all the agents tried. The sulphuric acid cannot be entirely removed from the leather by washing with water; a piece of leather containing 1 per cent. of sulphuric acid was washed for five days and nights in running water, and was afterwards found to contain one-fifth of the original quantity of acid. It was found, however, that if leather containing sulphuric acid is washed with potassium or sodium lactate or acetate the effects of the sulphuric acid are neutralised.

Sulphuric acid is also introduced into leather by the pickling which is used for preserving skins that are imported from New Zealand and Australia, the process consisting of acting on the skins with a solution of salt and sulphuric acid. Mr. Seymour-Jones has shown that formic acid may be used in the place of sulphuric acid, and is quite as efficacious. Sulphuric acid is employed in the dye bath for the purpose of liberating certain colours; it has been found that in this case also formic acid may be substituted.

Mr. Seymour-Jones has made a number of determinations of the mechanical strength of skins in their original condition, and also after tanning and other processes; it was found that the breaking stress of the leather is always below that of the original skin.

Valuable sections on the preparation of leather suitable for bookbinding, on bookbinding, and on the preservation of books appear in the report. Appendix i. consists of hints to owners and keepers of libraries by the chairman, Lord Cobham. Appendix ii. is on the fading of colour from sumach-tanned leather dyed with coal-tar colours, by Mr. M. C. Lamb, and is illustrated by coloured plates.

The book is excellently printed and illustrated, and inside the cover are specimens of six varieties of leather in their undyed and dyed conditions. The report should be read by all interested in books and libraries. H. M.

OUR BOOK SHELF.

A Treatise on Ore and Stone Mining. By Sir C. Le Neve Foster. Sixth edition, revised and enlarged by Bennett H. Brough. Pp. xxx+799. (London: Charles Griffin and Co., Ltd., 1905.) Price 34s.

THIS book, when it first appeared in 1894, was the first systematic treatise on mining published in England, and was quite up to date; but later editions were not sufficiently revised, and the hand of death put an end to the gifted author's intentions of rewriting the work. The preparation of a new edition could not have been entrusted to more competent hands than those of his old colleague Mr. Bennett H. Brough. The general arrangement of the book is the same as in former editions, except that chapter xiv., "Principles of Employment of Mining Labour," has become chapter xvii.

The revision of the whole work has been very thorough; recent discoveries of important occurrences of minerals and new methods of mining and treating ores have been brought up to date, while other methods, machinery and appliances, which have been superseded during the last few years, are omitted from this edition.

Additions to the work are interspersed throughout, so that it is difficult to make selections. More prominence is given to the important iron-ore deposits of Sweden and Norway, also to those of Spain. The various kinds of steam turbines, which may, under certain conditions, be used to advantage as motors for pumps, are briefly described. A considerable addition has been made to the list of important percussive rock drills now on the market. The Water Leyner rock drill with its water-flushing apparatus, which tends to prevent miners' phthisis, is introduced to the reader, and the recent important investigations of Dr. Haldane and Mr. Thomas into the mortality of Cornish miners receive the attention they deserve.

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